THE **VEHICLE**

THE **SATELLITE**

PROTON HISTORY

■ Lead designer, Vladimir Chelomei, designed it with the intention of creating both a powerful rocket for military payloads and a high-performance ICBM. The program was changed, and the rocket was developed exclusively for launching spacecraft.

■ First named UR-500, but adopted the name "Proton," which also was the name of the first three payloads launched.

Proton launched Russian interplanetary missions to the Moon, Venus, Mars, and Halley's Comet.

Proton launched the Salyut space stations, the Mir core segment and both the Zarya (Dawn) and Zvezda (Star) modules for today's International Space Station.

■ First commercial Proton launch — 9 April 1996.

■ First commercial Proton M Breeze M launch — 30 December 2002, Nimiq-2

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GROSS LIFTOFF WEIGHT 705,000 kg

(1,554,000 lb) **Propellant**

UDMH and NTO
INITIAL LAUNCH
16 July 1965

Proton-1 Spacecraft PayLoad Fairings

There are multiple payload fairing designs presently qualified for flight, including standard commercial payload fairings developed specifically to meet the needs of our customers.

Breeze M Upper Stage

The Breeze M is powered by one pump-fed gimbaled main engine that develops thrust of 20 kN (4,500 lbf). It is composed of a central core and an auxilliary propellant tank which is jettisoned in flight following depletion. The Breeze M control system includes an on-board computer, a three-axis gyro stabilized platform, and a navigation system. The quantity of propellant carried is dependent on specific mission requirements and is varied to maximize mission performance.

PROTON BOOSTER

The Proton booster is 4.1 m (13.5 ft) in diameter along its second and third stages, with a first stage diameter of 7.4 m (24.3 ft). Overall height of the three stages of the Proton booster is 42.3 m (138.8 ft).

THIRD STAGE

Powered by one RD-0213 engine, this stage develops thrust of 583 kN (131,000 lbf), and a four-nozzle vernier engine that produces thrust of 31 kN (7,000 lbf). Guidance, navigation, and control of the Proton M during operation of the first three stages is carried out by a triple redundant closed-loop digital avionics system mounted in the Proton's third stage.

SECOND STAGE

Of conventional cylindrical design, this stage is powered by three RD-0210 engines plus one RD-0211 engine and develops a vacuum thrust of 2.4 MN (540,000 lbf).

FIRST STAGE

The first stage consists of a central tank containing the oxidizer surrounded by six outboard fuel tanks. Each fuel tank also carries one of the six RD-276 engines that provide first stage power. Total first stage vacuum-rated level thrust is 11.0 MN (2,500,000 lbf).

The Proton and the Breeze M are built by Khrunichev State Research and Production Space Center.



SATELLITE OPERATOR

SES www.ses.com

SATELLITE MANUFACTURER

Space Systems/Loral www.ssloral.com

PLATFORM

SS/L 1300

SEPARATED MASS

6,180 kg

SATELLITE MISSION LIFETIME

15 Years

Satellite Mission

Poised to be the largest satellite in the SES fleet, SES-4 at 338° East replacing NSS-7, will enhance what is already the largest neighborhood in the Atlantic. SES-4 will be a hybrid satellite featuring high powered C-band coverage and incremental global capacity which is ideal for video distribution, government and VSAT services. The satellite's Ku-band payload will provide enhanced coverage and capacity across Europe, the Middle East, Africa, Western Africa and Latin America. SES-4 will bring a substantial increase in the total capacity available at 338° East. The state-of-the-art spacecraft has been specifically designed for its orbital location, with C-band beams serving the eastern hemisphere of Europe/Africa, full America's coverage as well as a global beam to support mobile and maritime customers. Four high powered regional Ku-band beams will provide service to Europe, the Middle East, West Africa, North America and South America with extensive cross-strapping between C- and Ku-band transponders providing enhanced connectivity.



Mission Overview



Experience ILS: Achieve Your Mission

QUALITY | PERFORMANCE | EXPERIENCE | DEDICATION



www.ilslaunch.com

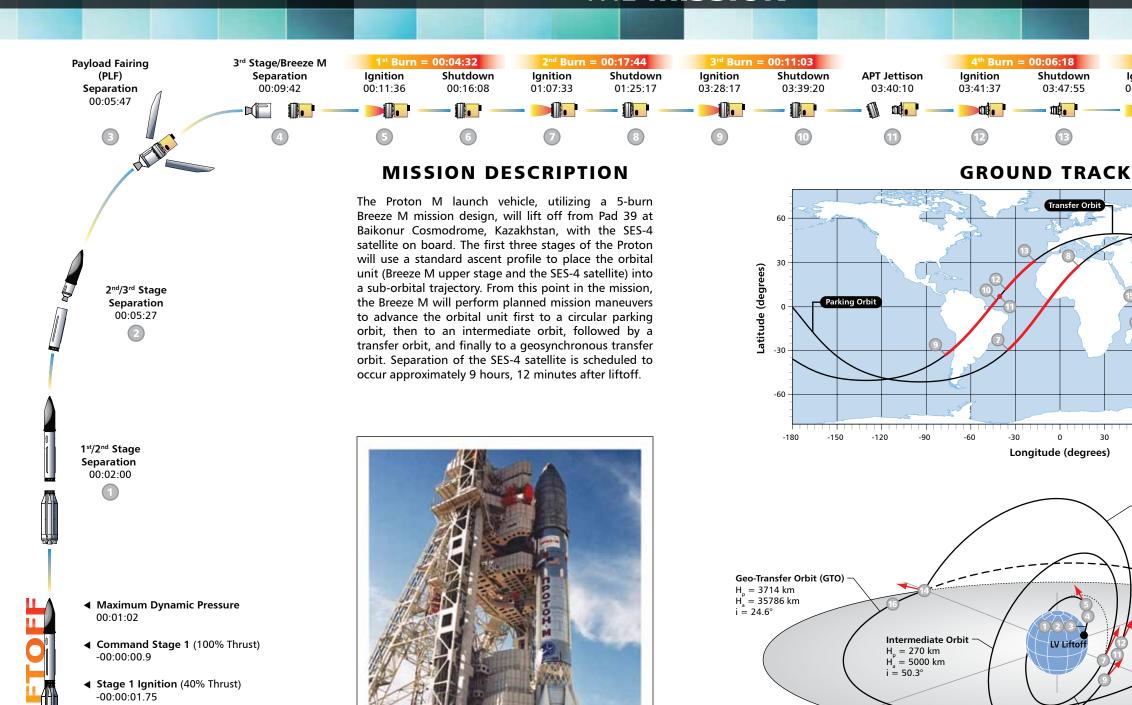
SES-4

- 20th SES Satellite Launch on ILS Proton
- 21st Space Systems/Loral Satellite Launched on ILS Proton
- **1st** ILS Proton Launch in 2012
- 70th ILS Proton Launch Overall

THE MISSION

Geostationary

Orbit (GSO)



ASCENT PROFILE

◄ Ignition Start Sequence

-00:00:02.5

LAUNCH PAD 39

PROTON ON PAD 39

FLIGHT DESIGN

5th Burn = 00:05:50

Shutdown

08:59:10

od.

-1234

120

Transfer Orbit $H_p = 430 \text{ km}$ $H_a = 35807 \text{ km}$ $i = 49.1^{\circ}$

- **Parking Orbit** H_p = 175 km H_a = 175 km

i = 51.5°

150

Ignition

08:53:20

Spacecraft

Separation

09:12:00